

Claims

We claim:

1. A *Borellia burgdorferi* epitope polypeptide with an amino acid sequence selected from the group consisting of:
5 VQEGVQQEGAQQP-(beta-A) (beta-,4)C; EIAAKAIGKKIHQNNNG-(beta-A) (beta-A)C; ISTLIKQKLDGLKNE-(beta-A) (beta-A)C; PWAESPKKPE-(beta-A) (beta-A)C; DKKAINLDKAQQKLD-(beta-A) (beta-A)C; ITKGKSQSLGD-(beta-A) (beta-A)C; and GMTFRAQEGAFLTG-(beta-A) (beta-A)C.
- 10 2. The composition of matter of claim 1, wherein said epitope polypeptide **comprises** VQEGVQQEGAQQP-(beta-A) (beta-,4)C.
3. The composition of matter of claim 2, wherein said epitope polypeptide **consists essentially of** VQEGVQQEGAQQP-(beta-A) (beta-,4)C.
- 15 4. The composition of matter of claim 1, wherein said epitope polypeptide comprises EIAAKAIGKKIHQNNNG-(beta-A) (beta-A)C.
5. The composition of matter of claim 4, wherein said epitope polypeptide consists essentially of EIAAKAIGKKIHQNNNG-(beta-A) (beta-A)C.
- 20 6. The composition of matter of claim 1, wherein said epitope polypeptide comprises ISTLIKQKLDGLKNE-(beta-A) (beta-A)C.
7. The composition of matter of claim 6, wherein said epitope polypeptide consists essentially of ISTLIKQKLDGLKNE-(beta-A) (beta-A)C.
- 25 8. The composition of matter of claim 1, wherein said epitope polypeptide comprises PWAESPKKPE-(beta-A) (beta-A)C.
9. The composition of matter of claim 8, wherein said epitope polypeptide consists essentially of PWAESPKKPE-(beta-A) (beta-A)C.
- 30 10. The composition of matter of claim 1, wherein said epitope polypeptide comprises DKKAINLDKAQQKLD-(beta-A) (beta-A)C.
11. The composition of matter of claim 10, wherein said epitope polypeptide consists essentially of DKKAINLDKAQQKLD-(beta-A) (beta-A)C.
- 35 12. The composition of matter of claim 1, wherein said epitope

- polypeptide comprises ITKGKSQKSLGD-(beta-A) (beta-A)C.
13. The composition of matter of claim 12, wherein said epitope polypeptide consists essentially of ITKGKSQKSLGD-(beta-A) (beta-A)C.
- 5 14. The composition of matter of claim 1, wherein said epitope polypeptide comprises GMTFRAQEGAFLTG-(beta-A) (beta-A)C.
15. The composition of matter of claim 14, wherein said epitope polypeptide consists essentially of GMTFRAQEGAFLTG-(beta-A) (beta-A)C.
- 10 16. A vaccine for immunizing against or treating for Lyme disease, the vaccine comprising an epitope polypeptide with an amino acid sequence selected from the group consisting of: VQEGVQQEGAQQP-(beta-A) (beta-,4)C ; EIAAKAIGKKIHQNNG-(beta-A) (beta-A)C ; ISTLIKQKLDGLKNE-(beta-A) (beta-A)C ; PWAESPKKPE-(beta-A) (beta-A)C ; DKKAINLDKAQQKLD-(beta-A) (beta-A)C ; ITKGKSQKSLGD-(beta-A) (beta-A)C ; and GMTFRAQEGAFLTG-(beta-A) (beta-A)C.
17. The vaccine of claim 16, wherein said epitope polypeptide 20 comprises VQEGVQQEGAQQP-(beta-A) (beta-,4)C.
18. The vaccine of claim 17, wherein said epitope polypeptide consists essentially of VQEGVQQEGAQQP-(beta-A) (beta-,4)C.
19. The vaccine of claim 16, wherein said epitope polypeptide comprises EIAAKAIGKKIHQNNG-(beta-A) (beta-A)C.
- 25 20. The vaccine of claim 19, wherein said epitope polypeptide consists essentially of EIAAKAIGKKIHQNNG-(beta-A) (beta-A)C.
21. The vaccine of claim 16, wherein said epitope polypeptide comprises ISTLIKQKLDGLKNE-(beta-A) (beta-A)C.
22. The vaccine of claim 21, wherein said epitope polypeptide 30 consists essentially of ISTLIKQKLDGLKNE-(beta-A) (beta-A)C.
23. The vaccine of claim 16, wherein said epitope polypeptide comprises PWAESPKKPE-(beta-A) (beta-A)C.
24. The vaccine of claim 23, wherein said epitope polypeptide consists essentially of PWAESPKKPE-(beta-A) (beta-A)C.
- 35 25. The vaccine of claim 16, wherein said epitope polypeptide comprises DKKAINLDKAQQKLD-(beta-A) (beta-A)C.

26. The vaccine of claim 25, wherein said epitope polypeptide consists essentially of DKKAINLDKAQQKLD-(beta-A) (beta-A)C.
27. The vaccine of claim 16, wherein said epitope polypeptide comprises ITKGKSQKSLGD-(beta-A) (beta-A)C.
- 5 28. The vaccine of claim 27, wherein said epitope polypeptide consists essentially of ITKGKSQKSLGD-(beta-A) (beta-A)C.
29. The vaccine of claim 28, wherein said epitope polypeptide comprises GMTFRAQEGAFLTG-(beta-A) (beta-A)C.
30. The vaccine of claim 29, wherein said epitope polypeptide 10 consists essentially of GMTFRAQEGAFLTG-(beta-A) (beta-A)C.
31. The nucleic acid sequence coding for a *Borellia burgdorferi* epitope polypeptide with an amino acid sequence selected from the group consisting of: VQEGVQQEGAQQP-(beta-15 A) (beta-, 4)C; EIAAKAIGKKIHQNNG-(beta-A) (beta-A)C; . ISTLIKQKLDGLKNE-(beta-A) (beta-A)C; PWAESP KKPE-(beta-A) (beta-A)C; DKKAINLDKAQQKLD-(beta-A) (beta-A)C; ITKGKSQKSLGD-(beta-A) (beta-A)C; and GMTFRAQEGAFLTG-(beta-A) (beta-A)C.
32. The composition of matter of claim 31, wherein said 20 epitope polypeptide comprises VQEGVQQEGAQQP-(beta-A) (beta-, 4)C.
33. The composition of matter of claim 32, wherein said epitope polypeptide consists essentially of VQEGVQQEGAQQP-(beta-A) (beta-, 4)C.
34. The composition of matter of claim 31, wherein said 25 epitope polypeptide comprises EIAAKAIGKKIHQNNG-(beta-A) (beta-A)C.
35. The composition of matter of claim 34, wherein said epitope polypeptide consists essentially of EIAAKAIGKKIHQNNG-(beta-A) (beta-A)C.
- 30 36. The composition of matter of claim 31, wherein said epitope polypeptide comprises ISTLIKQKLDGLKNE-(beta-A) (beta-A)C.
37. The composition of matter of claim 36, wherein said epitope polypeptide consists essentially of ISTLIKQKLDGLKNE-(beta-A) (beta-A)C.
- 35 38. The composition of matter of claim 31, wherein said epitope polypeptide comprises PWAESP KKPE-(beta-A) (beta-A)C.

39. The composition of matter of claim 38, wherein said epitope polypeptide consists essentially of PWAESPKP^E-(beta-A) (beta-A)C.
40. The composition of matter of claim 31, wherein said epitope polypeptide comprises DKKAINLDKAQQKLD-(beta-A) (beta-A)C.
- 5 41. The composition of matter of claim 40, wherein said epitope polypeptide consists essentially of DKKAINLDKAQQKLD-(beta-A) (beta-A)C.
42. The composition of matter of claim 31, wherein said 10 epitope polypeptide comprises ITKGKSQKSLGD-(beta-A) (beta-A)C.
43. The composition of matter of claim 42, wherein said epitope polypeptide consists essentially of ITKGKSQKSLGD-(beta-A) (beta-A)C.
44. The composition of matter of claim 31, wherein said 15 epitope polypeptide comprises GMTFRAQEGAFLTG-(beta-A) (beta-A)C.
45. The composition of matter of claim 44, wherein said epitope polypeptide consists essentially of GMTFRAQEGAFLTG-(beta-A) (beta-A)C.